in the form of a tea, it is claimed to enhance strength and sexual prowess.

• Amino acid supplements (processed protein, plant and animal). Although touted as a way to increase bulk, they have no advantage over a well-planned diet.

• Plant steroids. Various plant parts, touted as the "safe alternative" to anabolic steroids, offer no benefit.

• Mega-vitamins. Soldiers may take these on the assumption that if a little is good, a lot is better. Actually, though, water-soluble B and C vitamins taken in excess are excreted in the urine, doing neither good nor harm. On the other hand, fat-soluble A and D vitamins can be stored in harmful concentrations.

• DMSO. An anti-inflammatory cream, it is claimed to be safe but has not been approved for human use. It can decrease the pain from over-used soft tissue, but it has not been proved safe for the liver and kidneys.

• Cold capsules. Preparations such as Sudafed, Actifed, Entex, and Triaminic are used by some to help them sleep, by others to stay awake, and still others to curb appetite.

This is a very short list of some of the substances available to and, unfortunately, used by our soldiers in the hope of improving their performance.

How well do the drugs work in fulfilling those hopes? Many of the claims made for over-the-counter and off-the-shelf training aids are unfounded; they may be advertised under personal testimonials or unpublished studies. Most drugs do have a placebo effect; that is, part of the reason a drug user feels the intended effect is that he expects to feel it. In the case of some of these drugs, however, there is a noticeable improvement in performance.

The ethical and moral issues in the use of ergogenic aids in a peacetime Army that is training for modern battle have not been considered here. Nonetheless, because of the widespread use of drugs by the general public—whether these drugs are legal or not—the Army should develop more awareness of them and educate its leaders and soldiers to become more intelligent and healthier consumers.

Several sources of information and assistance are available to all soldiers and their leaders: Master Fitness Trainers, family physicians, brigade surgeons, the U.S. Olympic Committee's toll-free drug hotline (1-800-223-0393), and sports medicine physicians (board-certified family physicians who are trained in sports medicine). In the Army, sports medicine physicians include Major John Reasoner (Eisenhower Medical Center, Fort Gordon); Major Bill Roundtree (Martin Army Community Hospital, Fort Benning), Major Wade Lillegard (Madigan Army Medical Center, Fort Lewis), and me—Dr. John M. Henderson (6262 Hamilton Road, Columbus, GA 31995-9517; office (404) 324-6661, home (404) 568-3548.)

Dr. John M. Henderson recently completed an assignment at Martin Army Community Hospital at Fort Benning, Georgia, and has now returned to civilian practice.

Killing Enemy Armor

MAJOR JAMES B. LEAHY, JR.

As a member of the Army's Armor/Antiarmor Mobile Training Team, I learned (during visits to many of our Army's divisions, separate brigades, and major command headquarters) that many infantrymen and other combined arms leaders are still rigidly fixed to the principle of TOW missile employment that says "use standoff." This principle, which is typically perceived to mean "engage at maximum range," is applied to other weapons as well. It requires another look.

In an article in INFANTRY's January-February 1989 issue ("Weapon Positioning: The Circular Technique," pages 11-14), Lieutenant Colonel Pierce T. Graney and Dr. Robert H. Sulzen describe a shift in our defensive doctrine away from the concept of engaging an enemy force at maximum range and briefly provide some good reasons for it.

I would like to expand upon some of the issues and employment considerations they raised, placing particular emphasis on the TOW but also addressing the Bradley's 25mm gun and the M60A3 and M1 tanks' 105mm main gun (or 120mm for the M1A1).

(While all the information in this article is unclassified, I encourage infantry and combined arms leaders with SECRET or higher clearances to read (S) Training Circular 90-16, Antiarmor Operations on an Integrated Battlefield (U), Coordinating Draft, dated June 1988. As a result of responses from the field and information developed since the draft was published, the manual is scheduled to be distributed in February 1990.)

When the basic TOW missile was brought into the inventory nearly 20 years ago (1970), its primary target was

seen as a Soviet main battle tank carrying a main gun that delivered reasonably accurate aimed fire out to about 2,000 meters. The TOW, on the other hand, promised a high probability of hit (PH) and probability of kill (PK) out to 3,000 meters, which was then its maximum flight range.

The concept of using this difference in ranges, or TOW standoff, to kill tanks can be compared to the strategy a man might use for boxing against an opponent whose arms are only two-thirds as long as his—that is, keep himself far enough away so that the other fighter can't hurt him, while using his own longer reach to hurt his opponent.

That seems simple enough, but today, other factors have come into play:

Loss of Range Advantage. To expand on the boxing analogy, our enemy's arms are getting longer and his punches quicker. The November 1988 draft of Field Manual 100-23, Soviet Organization and Equipment, for example, cites the fielding of the AT-8 Songster antiarmor missile, which can be fired from the main guns of the Soviets' newer tanks such as the T-64Bs and the T-80s, and which reportedly has a range of 4,000 meters, some 250 to 1,000 meters greater than that of our different models of TOW missiles. (See table for a description of our currently fielded TOW missile systems and their primary characteristics.) The AT-8 is also reported to have a supersonic flight speed. This simply means that if a TOW gunner engages a Soviet tank that has this missile-firing capability at or near his TOW's maximum range and is detected, he may be hit by an AT-8 before his TOW missile can reach the target tank.

Enemy Suppressive Fire Capability. The Soviets continue to enjoy significant quantitative advantages in fire support, and they can bring massed fires from mortars and artillery to bear on identified antitank guided missile (ATGM) positions. Not incidentally, such positions are among the highest target engagement priorities for Soviet suppressive fires.

The sooner he can identify our ATGM positions, therefore, the sooner we can expect not only indirect suppressive fires with high explosive rounds, but also obscuration fires of smoke and HE designed to cut down on our ability to acquire and engage targets. Using thermal sights can help reduce the obscuration problem, but not all our ATGMs can be tracked through smoke.

Likelihood of Frontal Engagement. Since the introduction of armor on the battlefield, we have seen repeatedly that the longer the range to a target, the greater the likelihood that the target will be engaged somewhere in its 60-degree frontal arc. This is the area where tanks have the most armor protection, of course, and are thus the hardest to kill. The recent fielding of tanks equipped with explosive reactive armor, which covers primarily a tank's 60-degree frontal arc, makes the problem of killing tanks even harder.

Lower Probabilities of Hit and Kill at Extended Range. In laboratory environments, many of our systems maintain a very high PH out to extended ranges. In the real world, however, several factors come into play that can cut down on our gunners' ability to acquire and hit targets.

For one thing, the image a target presents at three kilometers or beyond is tough to acquire and track, even with 12- or 13-power magnification. At that range, the crosshair in a TOW sight often covers a large part of an armored vehicle target, especially if the vehicle is already partially masked by the terrain. Tracking is also often made tougher by heat shimmer rising from the ground's surface, or by blowing dust or smoke.

Maintaining a steady track on a target for periods of 10 to 12 seconds is well within the capability of most TOW gunners, but remaining steady and on the target for 20 seconds (almost the maximum flight range for 3,750-meter missiles) is a lot harder.

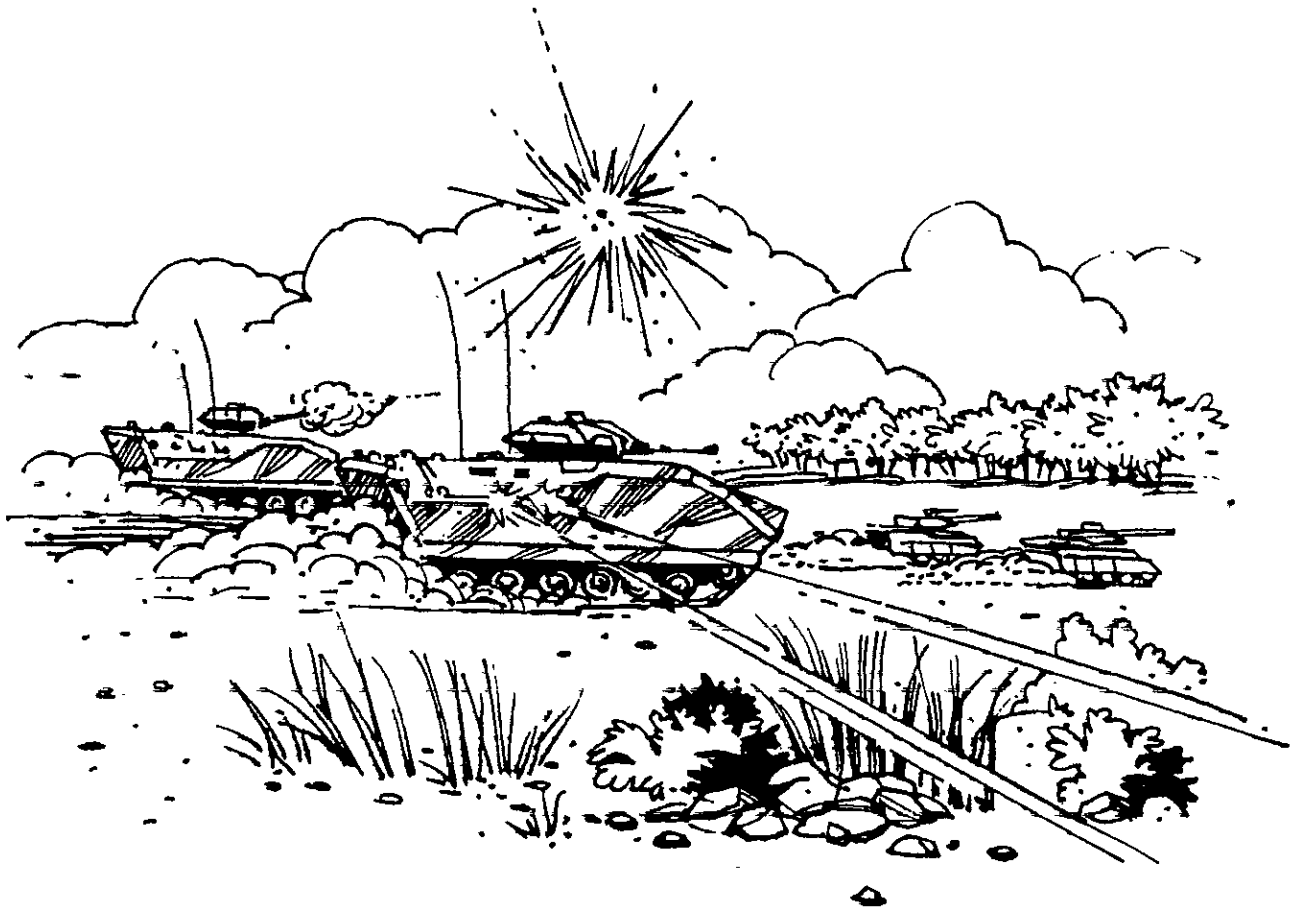
The TOW missile does not fly a straight line from launch to target. Rather, the launch motor propels the missile from the launcher, then the flight motor kicks in and eventually burns out. Once the flight motor stops, the missile is coasting. In fact, the missile oscillates up and down and, even if the crosshairs are steady on a target, requires a continuous series of corrections from the guidance system. At extended ranges, these corrections are slower and larger, and thus decrease the likelihood that a missile will hit the target where the gunner wants it to hit. When PH decreases, therefore, the chance that a commander will get the one-shot kill that he wants also decreases.

Loss of Surprise or Massed Fires. If we identify our positions for the enemy

Fielded TOW Missile Types

Type	Designator	Max Flight Range (Meters)	Warhead	Comments
Basic TOW	BGM 71A	3,000	5-inch unitary	
Basic TOW	BGM 71A-2	3,000	5-inch unitary	1
Basic TOW	BGM 71A-1	3,750	5-inch unitary	
Basic TOW	BGM 71A-3	3,750	5-inch unitary	1
Improved TOW	BGM 71C	3,750	5-inch unitary with probe	
Improved TOW	BGM 71C-1	3,750	5-inch unitary with probe	1
TOW 2	BGM 71D	3,750	6-inch unitary with probe	1,2
TOW 2A	BGM 71E	3,750	6-inch tandem with probe/tip charge	1,2,3

1. MOIC (Missile Ordnance Inhibit Circuit), which prevents fly-back of a missile in the event of a broken command link (wire).
2. Electronic countermeasure resistant when fired through TOW 2 launcher/subsystem.
3. Probe tip charge designed to defeat explosive reactive armor boxes, allowing main 6-inch warhead to work on basic hull armor.



by opening fire at extended ranges, we may lose two important, related advantages. First (assuming that we've done a good job of killing the enemy's reconnaissance elements), by identifying our positions, we give the enemy the option of maneuvering against us. Second, we lose the value of surprise, massed fires.

Taken individually, any of these factors may count against the traditional principle of using standoff and engaging at maximum range with the TOW system. Their combined effects, however, are so potentially crippling to our ability to mass combat power on an attacking enemy that we simply *must* change the way we routinely employ TOW missiles against enemy tanks.

I am not saying, of course, that a gunner should *never* engage targets with TOWs beyond two kilometers or so. But we as leaders need to recognize the problems that come with extended range engagements and the fact that these problems could be even worse if our targets should be modernized Soviet tanks.

It is equally important for leaders to realize that the maximum ranges of other vital weapon systems, such as the Bradley's 25mm gun and the tanks' main guns, are also affected by the variables of target type and target aspects.

The 25mm gun on the Bradley, for example, is a versatile weapon that can accomplish several tasks with its two types of ammunition. Its high explosive incendiary-tracer (HEI-T) ammunition provides good suppressive fires and a limited kill capability against lightly armored vehicles. And its current armor-piercing discarding sabot (APDS) round is capable of defeating armored infantry personnel carriers and fighting vehicles, but within certain limitations.

Recently fielded armor improvements to the Soviet BMP family of infantry fighting vehicles, for example, may well cut down on the distances at which a Bradley can penetrate a vehicle's frontal 60-degree arc with its current sabot rounds. (Bradley infantrymen need to know, however, that promising work is being aimed at developing a more effective 25mm sabot round.)

A Bradley gunner can still kill these newer vehicles, though, by using a combination of flank and rear shots, engaging at ranges closer than 2,200 meters, and firing more rounds into the target.

Many of the variables that work against TOW employment at extended ranges also apply to our tanks' main guns.

First, as good as our tank target acquisition equipment is, it suffers from some of the same limitations that affect the TOW daysight and the thermal sight.

Second, while it is true that explosive reactive armor offers little protection against kinetic energy (sabot) rounds, the frontal 60-degree arc of modern Soviet tanks is believed to be so tough to penetrate that even our current tank

main gun sabot rounds will have trouble getting one-shot kills at extended ranges. Here again, we face the historical fact that the greater the engagement range, the greater the likelihood that we'll be shooting at the 60-degree frontal arc of such vehicles.

The shorter employment ranges and the other compensating tactics and techniques mentioned above will allow us to overcome this deficiency without having to wait for the new and better ammunition that is already being fielded.

Finally, it is important to remember that the Soviets have not completely fielded their most modern tanks and infantry fighting vehicles. Most of their equipment, like ours, is fielded over a period of years.

Nevertheless, even our infantry and combined arms leaders who now face those front line Soviet divisions with the most modern equipment can still kill Soviet armor with the weapons they have today. To do so, however, they must have a good understanding of the capabilities and the limitations of their own weapons and must employ them accordingly.

Major James B. Leahy, Jr., enlisted in the Army in 1972, and was commissioned in Infantry from OCS in 1978. He was formerly assigned to the Infantry School, where he served as a tactics instructor, doctrine writer, and project officer. He is now attending the Command and General Staff College at Fort Leavenworth.

Team Eagle

CAPTAIN MARK J. PERRY
LIEUTENANT MARC A. SIERRA

The time has come to reconsider the current modified table of organization and equipment (MTOE) for a Bradley infantry fighting vehicle battalion.

The J-edition MTOE has three main deficiencies: First, it creates an awkward and excessively large headquarters and headquarters company (HHC). Second, it leaves the Echo Company (the antiarmor company) with reduced resources and few unique missions. Finally, it gives the battalion commander no significant, cohesive force with which to fight the reconnaissance and counter-reconnaissance battle.

The solution to all three of these problems lies in restructuring the HHC and the Echo Company by removing both the scout and the mortar platoons from the HHC and attaching them to Echo Company to create a "Team Eagle."

Under the J-edition MTOE, the number of personnel (339) alone can force even the most energetic and capable of HHC commanders to spread himself too thin. Too, the company's structure in itself creates a conflict in missions for the commander. In a garrison environment, for example, he is involved in daily mission-support activities that are essential in keeping both the battalion headquarters and his company functioning, while in the field he is the commander of the field trains. In both cases, his primary mission is support. With the scout and mortar platoons under his command, however, he is responsible for combat elements as well.

GUIDANCE

Although these platoons are usually led by two of the battalion's more capable senior first lieutenants, both still need guidance in planning and executing their training programs in garrison and in executing their combat mission in the field. Removing the scouts and the mortars from the HHC would not only help reduce its size to a more manageable level, it would allow the HHC commander to concentrate his full attention on his support functions. At the same time, it would place the scout and mortar platoons in a combat organization whose commander could more properly supervise and guide their activities.

Meanwhile, with the introduction of the Bradley infantry fighting vehicle (BIFV), the Echo Company's assets were reduced from 20 improved TOW vehicles (ITVs) to 12, with the number of M113s remaining constant at four and the number of soldiers down to 65, a considerable reduction in resources.

The fact that the BIFV is also equipped with the TOW missile system has had a significant effect on the number and the types of missions an Echo Company can reasonably be assigned. For instance, in a movement to contact conducted by a task force equipped with M1 tanks and BIFVs, the Echo Company's ITVs might reduce the force's speed and mobility while no longer offering the unique addition of firepower that they once did.

As a result of the changes in his company's size and mission, the Echo Company commander is now in a position to assume additional responsibilities. Since he is concerned solely with